blue, as imagined by Brewster, but red, green, and violet; the first and last forming the terminal parts of the spectrum, and the green occupying an intermediate position; and the various tints which intervene being the result of superpositions, in various quantities, of these respective primary colours. He pursues the consequences of this hypothesis, applying it to a great variety of forms of experiment, not only by the direct observation of beams of refracted light, but by viewing the prismatic spectrum through different media, capable of absorbing each of the primitive colours in different degrees: and he finds the results to accord exactly with the hypothesis he proposes, and on which he therefore concludes that their true explanation must be founded. He conceives that the errors of preceding experimentalists have arisen from their neglecting to take into account the effects of diffraction, which introduces considerable confusion into the results.

A paper was also read, entitled, "An Investigation of the Laws which govern the Motion of Steam-Vessels, deduced from experiment." By P. W. Barlow, Esq. Civil Engineer. Communicated by Dr. Roget, Sec. R.S.

The author commences with the description of a paddle-wheel for steam-vessels, of a new construction, in which the floats are made to enter and leave the water nearly in a vertical position. He then investigates several formulæ adapted to the calculation of the forces and velocities arising from this form of the apparatus; and gives an account of the results of various experiments made on its efficiency as compared with the common wheels, and with relation to the consumption of fuel. The general results to which he is led are as follow:—1st. When vessels are so laden as that the wheel is but slightly immersed, little advantage is derived from the vertically acting paddles. 2ndly. In cases of deep immersion, the latter has considerable advantage over the wheel of the usual construction. 3rdly. In the common wheel, while the paddle passes through the lower portion of the arc, that is when its position is vertical, it not only affords less resistance to the engine, but is less effective in propelling the vessel than in any part of its revolution. 4thlv. The paddle of the wheel, while passing through the lower portion of the arc, affords more resistance to the engine, and is more effective in propelling the vessel, than in any part of its revolution; a property which is a serious deduction from its value; for, in consequence of the total resistance to all the paddles being so much less than in the common wheel, much greater velocity is required to obtain the requisite pressure, and a greater expenditure of steam power is incurred. This loss of power is most sensible when the wheel is slightly immersed; but in cases of deep immersion the vertical paddle has greatly the advantage. 5thly. In any wheel, the larger the paddles the less is the loss of force; because the velocity of the wheel is not required to exceed that of the vessel in so great a degree, in order to acquire the resistance necessary to propel the vessel. 6thly. With the same boat and the same wheel no advantage is gained by reducing the paddle so as to

bring out the full power of the engine; the effect produced being simply that of increasing the speed of the wheel, and not that of the vessel. 7thly. An increase of speed will be obtained by reducing the diameter of the wheel; at least within such limits as allow of the floats remaining sufficiently immersed in the water; and provided the velocity of the engine does not exceed that at which it can perform its work properly. 8thly. An advantage would be gained by giving to the wheel a larger diameter, as far as the immersion of the paddles produced by loading the vessel would not so sensibly affect the angle of inclination of the paddle; but this advantage cannot be obtained with an engine of the same length of stroke, because in order to allow the engine to make its full number of strokes, it will then be necessary to diminish the size of the paddles, which is a much greater evil than having a wheel of smaller diameter with larger paddles.

The reading of a paper was then commenced, entitled, "On the Equilibrium of a Mass of Homogeneous Fluid at liberty." By James Ivory, Esq., K.H., M.A., F.R.S.

June 5, 1834.

FRANCIS BAILY, Esq., Vice-President, in the Chair.

John Marquess of Breadalbane; Charles John Lord Teignmouth; the Hon. George Elliot, R.N.; the Rev. Frederick William Hope, M.A.; Joseph Jekyll, jun., Esq., M.A.; the Rev. Robert Murphy, M.A.; the Hon. Sir George Rose; Richard Twining, Esq.; William Robert Whatton, Esq.; and George Witt, M.D., were elected Fellows of the Society.

Mr. Ivory's paper, entitled, "On the Equilibrium of a Mass of Homogeneous Fluid at liberty," was resumed and concluded.

The author shows that Clairaut's theory of the equilibrium of fluids, however seductive by its conciseness and neatness, and by the skill displayed in its analytical construction, is yet insufficient to solve the problem in all its generality. The equations of the upper surface of the fluid, and of all the level surfaces underneath it, are derived, in that theory, from the single expression of the hydrostatic pressure, and are entirely dependent on the differential equation of the surface. They require, therefore, that this latter equation be determinate and explicitly given; and accordingly they are sufficient to solve the problem when the forces are known algebraical expressions of the co-ordinates of the point of action; but they are not sufficient when the forces are not explicitly given, but depend, as they do in the case of a homogeneous planet, on the assumed figure of the fluid. In this latter case, the solution of the problem requires, farther, that the equations be brought to a determinate form by eliminating all that varies with the unknown figure of the fluid; and the means of doing